

Solvent extraction of rare earths

Feng Xie, Ting An Zhang, David Dreisinger, Fiona Doyle. *A critical review on solvent extraction of rare earths from aqueous solutions.*

The distribution coefficient of a metal ion, M, D_M (sometimes designated as K), particularly in earlier literature, is given by:

$$D_M = \frac{[\overline{M}]}{[M]} = K$$

where $[\overline{M}]$ is the molar concentration of M in the organic phase and $[M]$ is the concentration in the aqueous phase. The separation factor of two different metal ions, M_1 and M_2 , $\beta_{M1/M2}$, is defined as:

$$\beta_{M1/M2} = \frac{D_{M1}}{D_{M2}}$$

[...] The selectivity order for extracting rare earths from 0.5 M HCl solution with 0.75 M D2EHPA* in toluene was $\text{Lu} > \text{Yb} > \text{Tm} > \text{Tb} > \text{Eu} > \text{Pm} > \text{Pr} > \text{Ce} > \text{La}$ (Peppard and Wason, 1961), with the log of the **distribution coefficient** (called log K by Peppard et al. (1957a,b)) increasing linearly with the atomic number, Z, of the rare earth.

* D2EHPA = HDEHP = di-(2-ethylhexyl) phosphoric acid

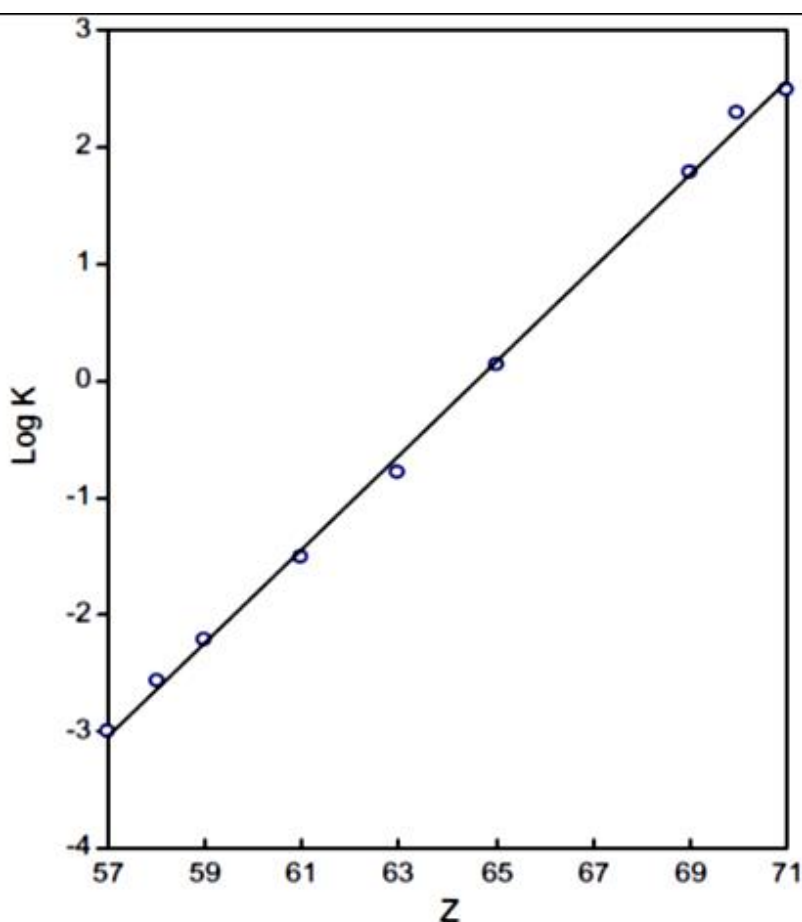


Fig. 2. Plot of Log K (Log D) as a function of atomic number (Z) (0.75 M HDEHP in toluene and 0.5 M HCl; Tracer concentrations of rare earths) (after Peppard et al., 1957a,b).